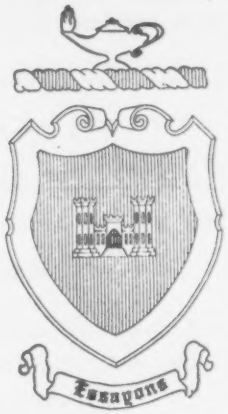
EL 2

52D10/20/30

PROGRAMED TEXT

ELECTRICITY

INTRODUCTION TO ELECTRICAL SYMBOLS



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US ARMY ENGINEER SCHOOL - FORT BELVOIR, VIRGINIA

D103.109/2:

This publication supercedes Programed Text, ELECTRICITY INTRODUCTION TO ELECTRICAL SYMBOLS, dated March 1973.

INSTRUCTIONS

This booklet is called a program, and it will be easy for you to learn the subject this program covers. It will be easy because of the way the information you are to learn is broken down into small parts, called frames. Each frame contains information you are to learn and presents you with a question to answer. This keeps your brain active -- just like answering questions in class. After you have written your answer to a frame, you will be able to see immediately the correct answer. This lets you know whether your answer is right or wrong -- just like having an instructor tell you whether your answer is correct or not. These three things: reading, answering questions, and being shown the correct answer will ensure that learning takes place.

Even though the program is designed to make it easy for you to learn, there are certain things you must do in order for it to be successful. If you will follow the suggestions listed below, you should have no trouble learning the material in this program.

1. Read the objectives very carefully before you begin, so you will know what you are to learn.
2. On pages that <u>do not require</u> a written response, study these pages very carefully and learn the name and symbol for each component shown.
3. On pages that <u>do require</u> a written response, keep the answer(s) covered with a slip of paper until you have written your answer(s).
4. After writing your answer(s), move the slip of paper to expose the correct answer(s)-- so you can see whether you are right or not.
5. Always follow, very carefully, any directions given in the program.
6. If there is something in the program you do not understand, ask the instructor for assistance.
7. When you have finished the program, read the objectives again to make sure you can do what the objectives require.
8. Take the self-test at the end of the program. This will indicate whether you have learned what you were supposed to learn.

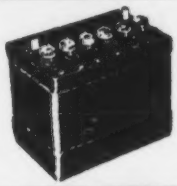
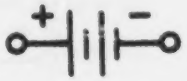
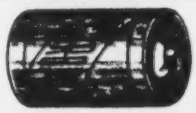
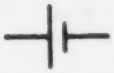
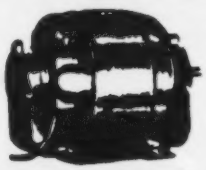
OBJECTIVES

1. Given a list of electrical symbols and a list of the names of electrical components, match the component names to their respective symbols.
2. Describe the difference between a wiring diagram and a schematic diagram.

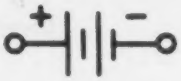
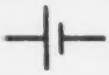
As a maintenance man, much of your time will be spent troubleshooting the equipment you are required to maintain. In order to understand how a system or a component operates, you must know the different electrical symbols used in the diagrams of aircraft electrical systems.

This lesson provides an introduction to some of the commonest symbols for electrical devices used in aircraft electrical systems, and also an introduction to the most frequently used types of electrical diagrams. Learn these symbols and diagrams thoroughly and you'll find electrical work much easier.

SUGGESTED READING TIME 30 MIN.

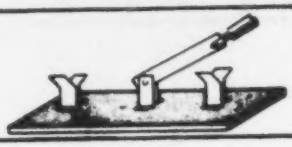
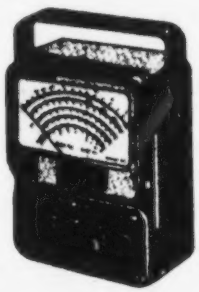
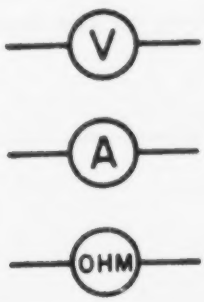
NAME	COMPONENT	SYMBOL
POLARITY-- positive negative		
GROUND		
CONNECTION		
NO CONNECTION		
BATTERY		
LAMP		
CELL		
FUSE		
MOTOR		
GENERATOR		

Match the components in column B to the respective symbols in column A.

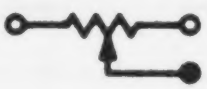
COLUMN A		COLUMN B
1. ____		a. Fuse
2. ____		b. Motor
3. ____		c. Lamp
4. ____		d. Polarity-- Pos & Neg
5. ____		e. Ground
6. ____		f. Battery
7. ____		g. Generator
8. ____		h. Connection
9. ____		i. Cell
10. ____		j. No Connection

Answers to the above:

1 - d	6 - c
2 - e	7 - i
3 - h	8 - a
4 - j	9 - b
5 - f	10 - g

NAME	COMPONENT	SYMBOL
SINGLE-POLE SINGLE-THROW SWITCH		
SINGLE-POLE DOUBLE-THROW SWITCH		
RESISTOR		
RHEOSTAT		
TRANSFORMER, IRON CORE		
TRANSFORMER, AIR CORE		
VOLTMETER AMMETER OHMMETER		

Match the components in column B to the respective symbols in column A.

COLUMN A	COLUMN B
1. ____	a. Voltmeter
2. ____	b. Resistor
3. ____	c. Transformer, iron core
4. ____ 	d. Transformer, air core
5. ____	e. Ammeter
6. ____	f. Ohmmeter
7.	g. Rheostat
8.	h. Single-pole Single-throw switch
9.	i. Single-pole Double-throw switch

Answers to the above:

1 - h	6 - c
2 - i	7 - a
3 - b	8 - e
4 - g	9 - f
5 - d	

READEX FICHE best copy available

Name each symbol shown below.

1. _____.

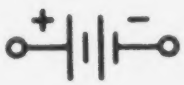
2.

_____.

3. _____.

4. _____.

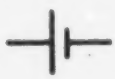
5. _____.

6.  _____.

7.

_____.

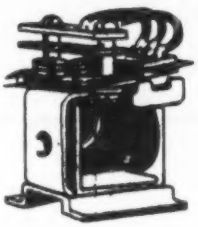
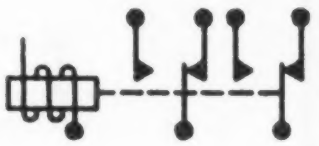
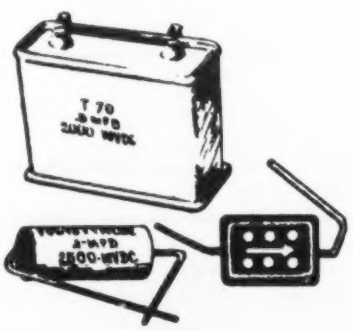
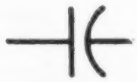
8. _____.

9.  _____.

10. _____.

Answers to the above:

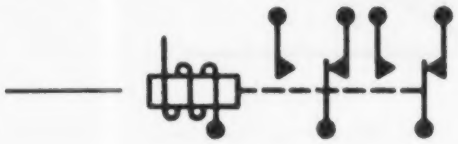
1. FUSE
2. MOTOR
3. LAMP
4. GROUND
5. POLARITY POLES
6. BATTERY
7. GENERATOR
8. CONNECTION
9. CELL
10. NO CONNECTION

NAME	COMPONENT	SYMBOL
METALLIC RECTIFIER		
RELAY COIL WITH CONTACTS		
PUSH-PULL CIRCUIT BREAKER		
CAPACITOR, FIXED		

Match the components in column B to the respective symbols in column A.

COLUMN A

1.

2. 

3.

4.

COLUMN B

a. Capacitor, fixed

b. Push-pull circuit breaker

c. Metallic rectifier

d. Relay coil with contacts

Answers to the above:

1 - c

2 - d

3 - b

4 - a

Name each symbol shown below.

1. _____.

2. _____.

3. _____.

4.

_____.

5.

_____.

6. _____.

7. _____.

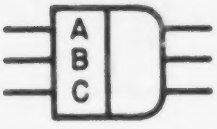
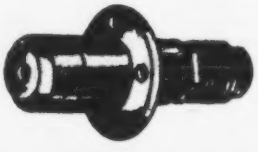
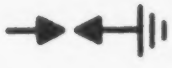
8.

_____.

9. _____.

Answers to the above:

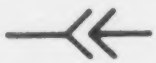
1. RESISTOR
2. RHEOSTAT
3. TRANSFORMER, AIR CORE
4. VOLTMETER
5. AMMETER
6. SINGLE-POLE, SINGLE-THROW SWITCH
7. SINGLE-POLE, DOUBLE-THROW SWITCH
8. OHMMETER
9. TRANSFORMER, IRON CORE

NAME	COMPONENT	SYMBOL
SOLENOID		
CONNECTOR, PLUG AND RECEPTACLE (Cannon Plug)		
DISCONNECT		
SPARK IGNITER		
SPARK PLUG		

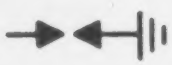
Match the components in column B to the respective symbols in column A.

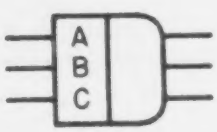
COLUMN A

1. _____

2. _____ 

3. _____

4. _____ 

5. _____ 

COLUMN B

a. Disconnect

b. Connector, Plug and Receptacle (cannon plug)

c. Solenoid

d. Spark Plug

e. Spark Igniter

Answers to the above:

1 - c

2 - a

3 - e

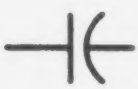
4 - d

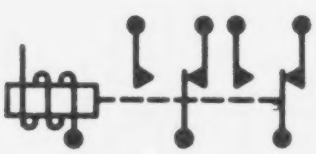
5 - b

Name each symbol shown below.

1. _____.

2. _____.

3.  _____.

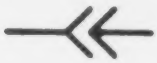
4.  _____.

Answers to the above:

1. METALLIC RECTIFIER
2. PUSH-PULL CIRCUIT BREAKER (MANUAL)
3. CAPACITOR, FIXED
4. RELAY COIL WITH CONTACTS

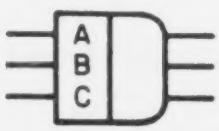
Name each symbol shown below.

1. _____.

2.  _____.

3. _____.

4. _____.

5. 

_____.

Answers to the above:

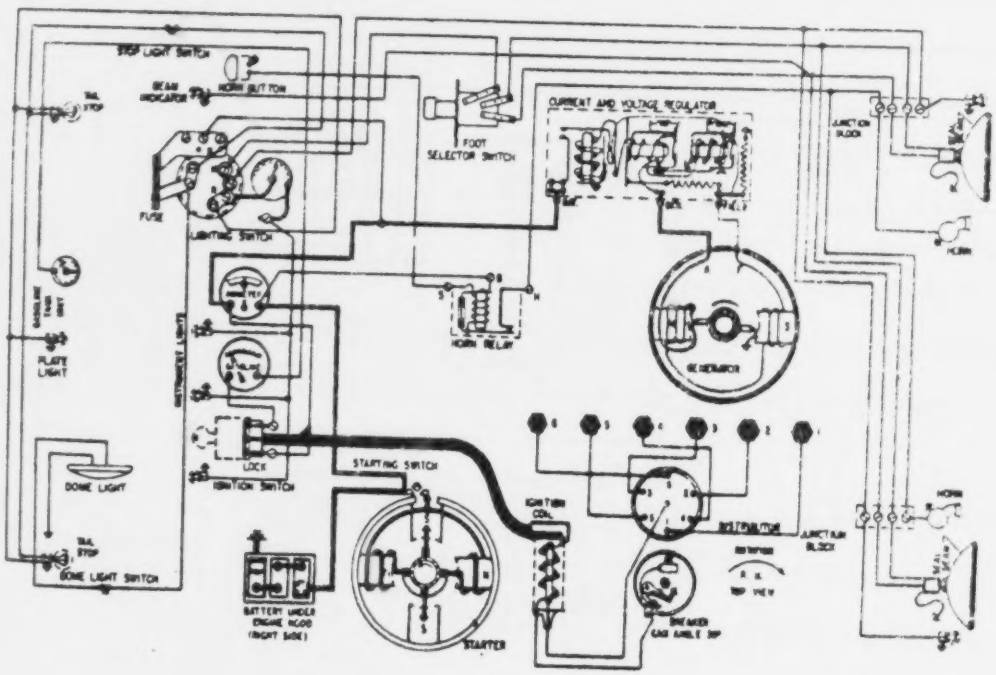
1. SOLENOID
2. DISCONNECT
3. SPARK IGNITER
4. SPARK PLUG
5. CONNECTOR, PLUG AND RECEPTACLE (Cannon Plug)

There are many different types of drawings used to illustrate electrical layouts, but it would be impractical to discuss all of them. Therefore, only those drawings that you, the maintenance man, are apt to use frequently will be explained.

The drawings that will be discussed are the wiring diagram and the schematic diagram. These two types of drawings are the ones most often used in connection with maintenance work.

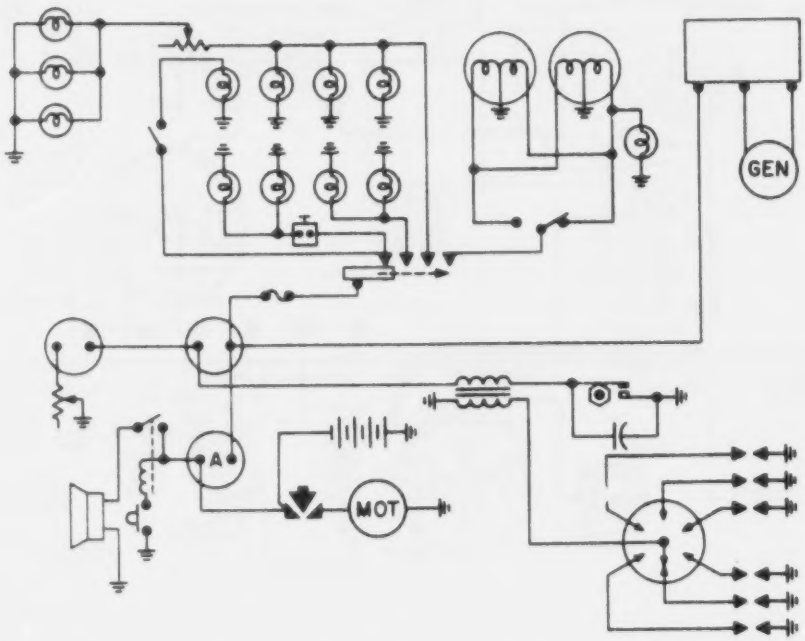
A wiring diagram is a drawing showing a circuit in a simplified form, and is arranged so the physical location of parts is similar to the layout of the actual equipment.

Here is a drawing of an automobile electrical system. Notice the simplified form and how the physical location of the parts is similar to the actual equipment. This type of drawing is a _____ _____.



WIRING DIAGRAM	**Describe a wiring diagram.** _____ _____ _____
YOUR ANSWER SHOULD HAVE THE SAME MEANING AS THE ONE ON THE RIGHT.	A drawing showing a circuit in a simplified form, and arranged so the physical location of the parts is similar to the layout of the actual equipment.

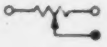
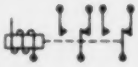
A schematic diagram is a drawing of a circuit in which the parts are represented by symbols, and they may be arranged quite differently from their actual physical arrangement. Shown below is a drawing of an automobile electrical system. Notice the parts are represented by symbols arranged differently from their actual arrangement. This type of drawing is a _____ _____.



SCHEMATIC DIAGRAM	Describe a schematic diagram. _____ _____ _____
YOUR ANSWER SHOULD HAVE THE SAME MEANING AS THE ONE ON THE RIGHT.	A schematic diagram is a drawing of a circuit in which the parts are represented by symbols, and arranged quite differently from their actual physical arrangement.
	Describe the difference between a wiring diagram and a schematic diagram. _____ _____ _____ _____ _____
YOUR ANSWER SHOULD HAVE THE SAME MEANING AS THE ONE ON THE RIGHT.	A wiring diagram is a drawing showing a circuit in a simplified form, and is arranged so the physical location of the parts is similar to the layout of the actual equipment. A schematic diagram is a drawing of a circuit in which the parts are represented by symbols,and they are arranged quite differently from the actual equipment. END OF LESSON

SELF-TEST

Match each component to its respective symbol.

1. ____
2. ____
3. ____
4. ____
5. ____
6. ____
7. ____
8. ____
9. ____
10. ____
11. ____
12. ____
13. ____
14. ____
15. ____
16. ____
17. ____
18. ____ 
19. ____
20. ____ 
21. ____
22. ____
23. ____
24. ____
25. ____

26. ____
27. ____
28. ____

a. Polarity-- Pos. & Neg.
b. Ground
c. Lamp
d. Connection
e. No Connection
f. Cell
g. Battery
h. Fuse
i. Generator
j. Motor
k. Resistor
l. Rheostat
m. Voltmeter
n. Ammeter
o. Ohmmeter
p. Disconnect
q. Single-pole single-throw switch
r. Single-pole double-throw switch
s. Push-pull circuit breaker
t. Capacitor, fixed
u. Transformer, air core
v. Transformer, iron core
w. Relay coil with contacts
x. Solenoid
y. Metallic rectifier
z. Spark igniter
aa. Spark plug
bb. Connector, plug and receptacle (Cannon Plug)

2. Describe the difference between a wiring diagram and a schematic diagram.

_____

_____

_____

_____

_____

Answers to Self-test:

1. d	15. o
2. e	16. k
3. y	17. c
4. a	18. l
5. b	19. f
6. g	20. w
7. q	21. aa
8. r	22. v
9. m	23. u
10. p	24. t
11. j	25. bb
12. n	26. x
13. h	27. s
14. i	28. z

2. A wiring diagram is a drawing showing a circuit in a simplified form, and is arranged so the physical location of parts is similar to the layout of the actual equipment, while a schematic diagram is a drawing of a circuit in which the parts are represented by symbols, and they may be arranged quite differently from their actual physical arrangement.

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